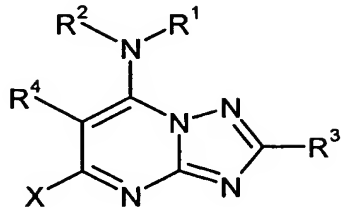
Patent Claims

1. Triazolopyrimidines of the formula



(I)

in which

R^1 represents optionally substituted alkyl, optionally substituted alkenyl, optionally substituted alkynyl, optionally substituted cycloalkyl, or optionally substituted heterocyclyl,

R^2 represents hydrogen or alkyl, or

R^1 and R^2 together with the nitrogen atom to which they are bound, represent a optionally substituted heterocyclic ring,

R^3 represents halogen, optionally substituted alkyl, or optionally substituted cycloalkyl,

R^4 represents optionally substituted heterocyclyl,

X represents halogen.

2. Triazolopyrimidines of the formula (I) according to Claim 1, in which

R^1 represents alkyl having 1 to 6 carbon atoms, which may be substituted one to five times, identically or differently, by halogen, cyano, hydroxy, alkoxy having 1 to 4 carbon atoms and/or cycloalkyl having 3 to 6 carbon atoms, or

R^1 represents alkenyl having 2 to 6 carbon atoms, which may be substituted one to three times, identically or differently by halogen, cyano, hydroxy, alkoxy having 1 to 4 carbon atoms and/or cycloalkyl having 3 to 6 carbon atoms, or

R^1 represents alkynyl having 2 to 6 carbon atoms, which may be substituted one to three times, identically or differently by halogen, cyano, alkoxy having 1 to 4 carbon atoms and/or cycloalkyl having 3 to 6 carbon atoms, or

R^1 represents cycloalkyl having 2 to 6 carbon atoms, which may be substituted one to three times, identically or differently by halogen, cyano, hydroxy, alkoxy having 1 to 4 carbon atoms and/or alkyl having 1 to 4 carbon atoms, or

R^1 represents saturated or unsaturated heterocyclyl having 5 or 6 ring members and 1 to 3 heteroatoms, such as nitrogen, oxygen, and/or sulphur, the heterocyclyl able to be substituted once or twice by halogen, alkyl having 1 to 4 carbon atoms, cyano, nitro and/or cycloalkyl having 3 to 6 carbon atoms,

R^2 represents hydrogen or alkyl having 1 to 4 carbon atoms, or

R^1 and R^2 together with the nitrogen atom to which they are bound, represent a saturated or unsaturated heterocyclic ring having 3 to 6 ring elements, the heterocyclic compound able to contain a further nitrogen, oxygen, or sulphur atom as a ring element and the heterocyclic compound able to be substituted up to three times by fluorine, chlorine, bromine, nitro, alkyl having 1 to 4 carbon atoms and/or halogenalkyl having 1 to 4 carbon atoms and 1 to 9 fluorine and/or chlorine atoms,

R^3 represents fluorine, chlorine, bromine, iodine, alkyl having 1 to 4 carbon atoms, halogenalkyl having 1 to 4 carbon atoms and 1 bis 9 halogen atoms or cycloalkyl having 3 to 6 carbon atoms,

R^4 represents saturated or unsaturated heterocyclyl having 5 or 6 ring members and 1 to 4 heteroatoms, such as oxygen, nitrogen and/or sulphur, the heterocyclyl being able to be substituted one to four times, identically or differently by

fluorine, chlorine, bromine, cyano, nitro,

alkyl, alkoxy, hydroximinoalkyl or alkoximinoalkyl each having 1 to 3 carbon atoms in each alkyl part,

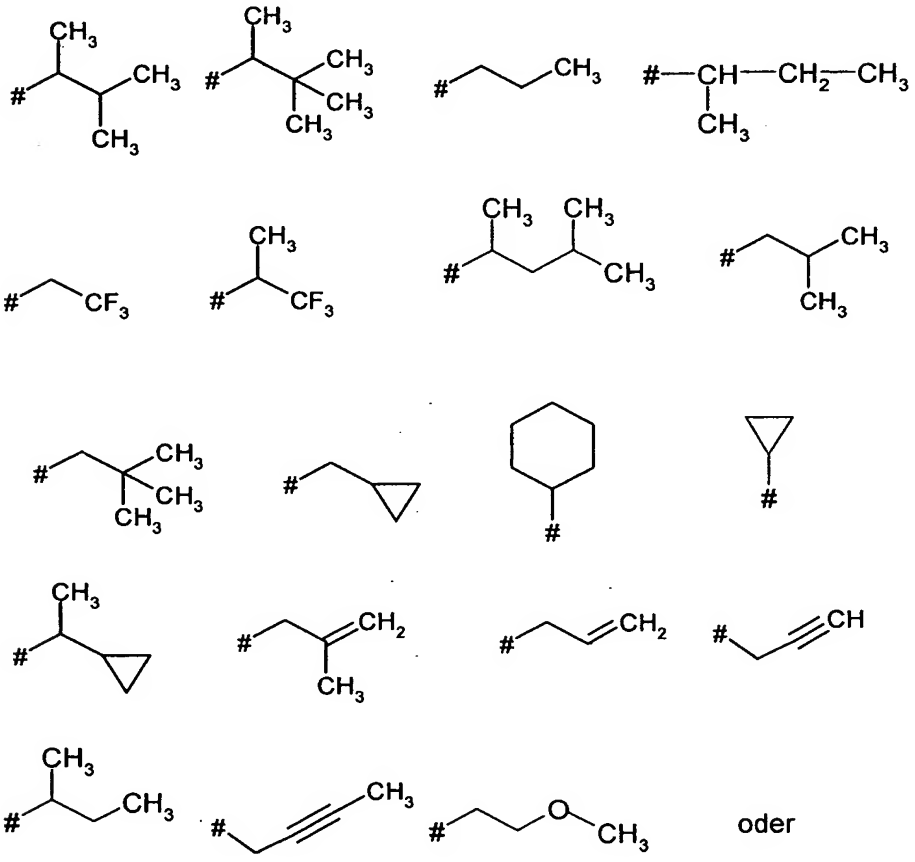
halogenalkyl or halogenalkoxy each having 1 to 3 carbon atoms and 1 to 7 halogen atoms,

and

X represents fluorine, chlorine, bromine or iodine.

3. Triazolopyrimidines of the formula (I) according to Claim 1 or 2, in which

R^1 represents a residue of the formula



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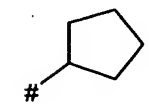


steht,

(Key: oder = or

steht = represents)

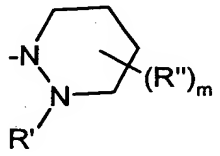
marking the linkage point,

R^2 represents hydrogen, methyl, ethyl or n-propyl, or

R^1 and R^2 together with the nitrogen atom, to which they are bound, represent pyrrolidinyl, piperidinyl, morpholinyl, thiomorpholinyl, piperazinyl, 3,6-dihydro-1(2H)-piperidinyl or tetrahydro-1(2H)-pyridazinyl, these residues being able to be substituted by 1 to 3 fluorine atoms, 1 to 3 methyl groups and/or trifluoromethyl,

or

R^1 and R^2 together with the nitrogen atom, to which they are bound, represent a residue of the formula



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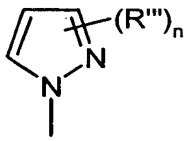


stehen,

(Key: oder = or)

in which

R' represents hydrogen or methyl,

R" represents methyl, ethyl, fluorine, chlorine or trifluoromethyl,

m represents the numbers 0, 1, 2 or 3, R" representing identical or different residues if m represents 2 or 3,

R'" represents methyl, ethyl, fluorine, chlorine or trifluoromethyl and

n represents the numbers 0, 1, 2 or 3, R'" representing identical or different residues if n represents 2 or 3,

R^3 represents fluorine, chlorine, bromine, iodine, methyl, ethyl, n-propyl, isopropyl, trifluoromethyl, 1-trifluoromethyl-2,2,2-trifluorethyl, heptafluoroisopropyl, cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl,

R^4 represents pyridyl, which is linked in the second or fourth position and may be substituted one to four times, identically or differently, by fluorine, chlorine, bromine, cyano, nitro, methyl, ethyl, methoxy, methylthio, hydroximinomethyl, hydroximinoethyl, methoximinomethyl, methoximinoethyl and/or trifluoromethyl, or

R^4 represents pyrimidyl steht, which is linked in the second or fourth position and may be substituted one to three times, identically or differently, by fluorine, chlorine, bromine, cyano, nitro, methyl, ethyl, methoxy, methylthio, hydroximinomethyl, hydroximinoethyl, methoximinomethyl, methoximinoethyl and/or trifluoromethyl, or

R^4 represents thienyl, which is linked in the second or third position and may be substituted one to three times, identically or differently, by fluorine, chlorine, bromine, cyano, nitro, methyl, ethyl, methoxy, methylthio, hydroximinomethyl, hydroximinoethyl, methoximinomethyl, methoximinoethyl and/or trifluoromethyl, or

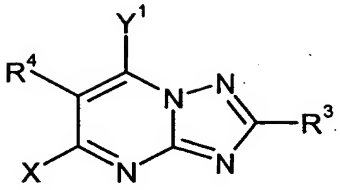
R^4 represents thiazolyl, which is linked in the second, fourth, or fifth position and may be substituted once or twice, identically or differently, by fluorine, chlorine, bromine, cyano, nitro, methyl, ethyl, methoxy, methylthio, hydroximinomethyl, hydroximinoethyl, methoximinomethyl, methoximinoethyl and/or trifluoromethyl,

and

X represents fluorine, chlorine or bromine.

4. A method for producing triazolopyrimidines of the formula (I) according to one of Claims 1 through 3,
characterized in that

(a) dihalogen triazolopyrimidines of the formula



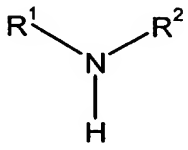
(II)

in which

R^3, R^4 and X have the meanings specified in one of Claims 1 through 3 and

Y^1 represents halogen,

are reacted with amines of the formula



(III)

in which

R^1 and R^2 have the meanings specified in one of Claims 1 through 3,

optionally in the presence of a diluent, optionally in the presence of an acid acceptor, and optionally in the presence of a catalyst.

5. Agents for combating undesired micro-organisms,
characterized by a content of at least one triazolopyrimidine of the formula (I) according to one of Claims 1 through 3, in addition to extenders and/or surfactants.

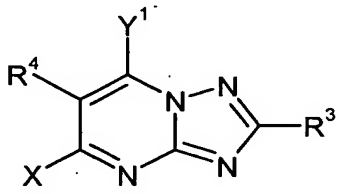
6. A use of triazolopyrimidines of the formula (I) according to one of Claims 1 through 3 for combating undesired micro-organisms.

7. A method for combating undesired micro-organisms,
characterized in that triazolopyrimidines of the formula (I) according to one of Claims 1 through 3 are applied to the undesired micro-organisms and/or their living space.

8. A method for producing agents for combating undesired micro-organisms,

characterized in that triazolopyrimidines of the formula (I) according to one of Claims 1 through 3 are mixed with extenders and/or surfactants.

9. Dihalogen triazolopyrimidines of the formula



(II)

in which

R^3 represents halogen, optionally substituted alkyl or optionally substituted cycloalkyl,

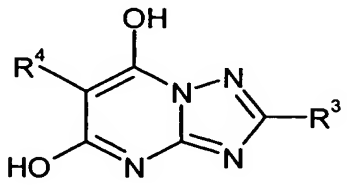
R^4 represents optionally substituted heterocyclyl,

X represents halogen, and

Y^1 represents halogen.

10. A method for producing dihalogen triazolopyrimides of the formula (II) according to Claim 9,
characterized in that

(b) dihydroxy triazolopyrimidines of the formula



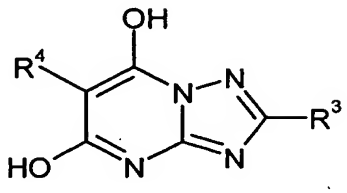
(IV)

in which

R^3 and R^4 which have the meanings specified in Claim 7,

are reacted with halogenation agents, optionally in the presence of a diluent.

11. Dihydroxy triazolopyrimidines of the formula



(IV)

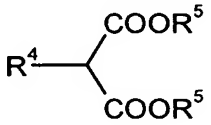
in which

R^3 represents halogen, optionally substituted alkyl or optionally substituted cycloalkyl,

R^4 represents optionally substituted heterocyclyl.

12. A method for producing dihydroxy triazolopyrimidines of the formula (IV) according to Claim 11,
characterized in that

(c) heterocyclyl malonic esters of the formula



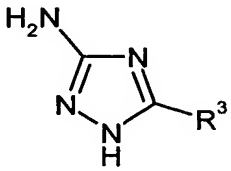
(V)

in which

R^4 has the meanings specified in Claim 9 and

R^5 represents alkyl having 1 to 4 carbon atoms,

are reacted with aminotriazoles of the formula



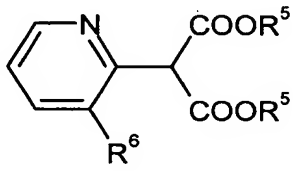
(VI)

in which

R^3 has the meaning specified in Claim 9,

optionally in the presence of a diluent and optionally in the presence of an acid binder.

13. Pyridyl malonic esters of the formula



(V-a)

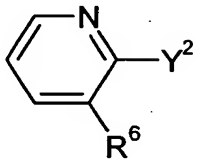
in which

R^5 represents alkyl having 1 to 4 carbon atoms and

R^6 represents halogen or halogenalkyl.

14. A method for producing pyridyl malonic esters of the formula (V-a) according to Claim 13,
characterized in that

(d) halopyridines of the formula



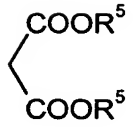
(VII)

in which

R^6 has the meaning specified in Claim 11 and

Y^2 represents halogen,

are reacted with malonic esters of the formula



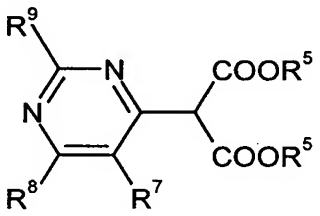
(VIII)

in which

R^5 has the meaning specified in Claim 11,

optionally in the presence of a diluent, optionally in the presence of a copper salt, and optionally in the presence of an acid acceptor.

15. Pyrimidyl malonic esters of the formula



(V-b)

in which

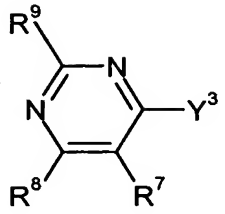
R^5 represents alkyl having 1 to 4 carbon atoms,

R^7 represents halogen or halogenalkyl, and

R^8 and R^9 independently of one another, represent hydrogen, fluorine, chlorine, bromine, methyl, ethyl or methoxy.

16. A method for producing pyrimidyl malonic esters of the formula (V-b) according to Claim 15,
characterized in that

(e) halopyrimidines of the formula



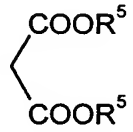
(IX)

in which

R^7, R^8 and R^9 have the meanings specified in Claim 13 and

Y^3 represents halogen,

are reacted with malonic esters of the formula



(VIII)

in which

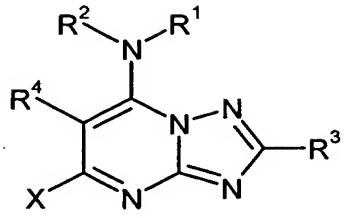
R^5 has the meaning specified in Claim 13,

optionally in the presence of a diluent, optionally in the presence of a copper solid, and optionally in the presence of an acid acceptor.

Triazolopyrimidines

Abstract

New triazolopyrimidines of the formula



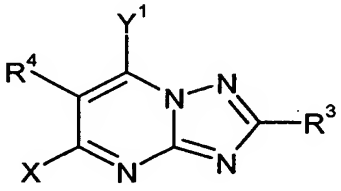
(I)

in which

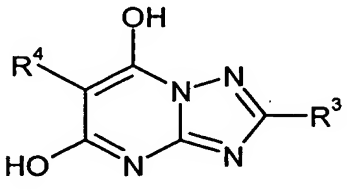
R^1, R^2, R^3, R^4 and X have the meanings specified in the description,

a method for producing these materials and their use for combating undesired micro-organisms.

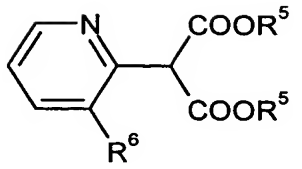
New intermediate products of the formulas



(II)

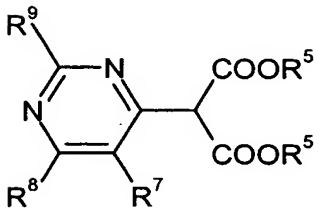


(IV).



(V-a)

and



(V-b)

and methods for producing these materials.